INTRODUCTION

LINCOLN PARK STUDY AREA SURFACE SOILS
LINCOLN PARK SUPERFUND SITE
CAÑON CITY, COLORADO

The U.S. Environmental Protection Agency ("EPA"), with the concurrence of the Colorado Department of Public Health and Environment ("CDPHE" or "the State"), presents this Record of Decision ("ROD") for the surface soils within the Lincoln Park Study Area of the Lincoln Park Superfund Site in Cañon City, Colorado. The ROD is based on the Administrative Record for the Lincoln Park Study Area, including the Remedial Investigation/Feasibility Study ("RI/FS"), the Remedial Action Plan ("RAP"), the human and ecological risk assessments, the Lincoln Park Study Area Proposed Plan ("Proposed Plan"), public comments received, and EPA/CDPHE responses to those comments.

The ROD contains a brief summary of the studies performed and actions taken at the site, actual and potential risks to human health and the environment, and the selected remedy. EPA followed the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, ("CERCLA"), the National Oil and Hazardous Substances Pollution Contingency Plan (the National Contingency Plan, or the "NCP"), and EPA guidance (EPA, 1999) in preparation of the ROD. The three purposes of this ROD are to:

1. Certify that the remedy selection process was carried out in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. 9601 *et seq.*, as amended by the Superfund Amendments and Reauthorization Act ("SARA"), and, to the extent practicable, the NCP;

2. Outline the remediation requirements of the selected remedy for the surface soils; and

3. Provide the public with a concise source of information about the history, characteristics, and risks posed by conditions present in the Lincoln Park Study Area, the rationale behind the selected remedy for the surface soils, and the agencies' consideration of, and responses to, the comments received.

This ROD is organized into three sections:

1. The **Declaration** section contains a brief description of the selected remedy for the surface soils and the formal authorizing signature page for the ROD.

2. The **Decision Summary** section provides an overview of the Lincoln Park Study Area site history and enforcement activities, site characteristics, and a summary of the human health and ecological risks. The Decision Summary also identifies the selected remedy for the surface soils and explains how the remedy fulfills statutory and regulatory requirements.

3. The **Responsiveness Summary** section serves the dual purpose of: (a) presenting the public's concerns about the site and the preferred remedy identified in the Proposed Plan; and (b) explaining how the public's concerns were addressed and how the concerns were factored into the remedy selection process.

DECLARATION FOR THE RECORD OF DECISION

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Lincoln Park Study Area (Operable Unit 2), Surface Soils
Lincoln Park Superfund Site; Cañon City, Colorado (CERCLIS # COD042167858)

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedy for the surface soils within the Lincoln Park Study Area, which is a part of the Lincoln Park Superfund Site in Cañon City, Colorado. EPA and CDPHE selected the remedy in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986, and to the extent practicable, the NCP.

This decision is based on the Administrative Record for the Lincoln Park Study Area portion of the Lincoln Park Superfund Site. The Administrative Record (on microfilm) and copies of key documents are available for review at the Cañon City Public Library, located at 516 Macon Avenue in Cañon City, Colorado, and at the Colorado Department of Public Health and Environment, Laboratory Building, Laboratory and Radiation Services Division, 8100 Lowry Boulevard, Denver, Colorado. The Administrative Record for this decision may also be reviewed at the EPA Superfund Records Center, located at 999 18th Street, 5th Floor, North Terrace in Denver, Colorado.

DESCRIPTION OF THE SELECTED REMEDY

The Lincoln Park Study Area is one of two operable units ("OUs") at the Lincoln Park Superfund Site. The Lincoln Park Study Area (OU2) includes that portion of the Lincoln Park neighborhood affected by Cotter Corporation's ("Cotter's") Cañon City uranium mill operations. Operable Unit 1, which is defined as a portion of Cotter's Cañon City mill property, is not the subject of this ROD and will be addressed in a subsequent action.

Since 1986, the State has been acting as the lead agency in addressing contamination problems at both operable units. State authorization governing use and disposal of radioactive materials are applicable to Cotter's Cañon City mill; the State has incorporated all legal requirements developed under CERCLA into the Radioactive Materials License.

The cleanup strategies for the Lincoln Park Superfund Site are to isolate and/or reduce the mobility of contaminated materials within source areas at Cotter's Cañon City mill property and to reduce exposure to contaminated soils and ground water, in order to protect human health and the environment. The action necessary to achieve the cleanup strategy for surface soils within the Lincoln Park Study Area has already been completed by Cotter Corporation, as required by CDPHE and EPA. Therefore, no further action is required.

In 1971, the Soil Conservation Service ("SCS") completed construction of an earthen dam across Sand Creek on Cotter's property. The dam was built to control flooding and has also served to prevent downstream movement of surface water and sediment from the mill site. Beginning in 1979, impounded water collected at the SCS dam was pumped back to the main impoundment.

In the early 1980's, millions of cubic yards of tailings (processed ore wastes) were moved from the old, unlined ponds into a new, lined impoundment cell. In the late 1980's, contaminated soils were removed from the old tailings ponds and placed in the impoundment cell. These two actions served to effectively eliminate the source of contamination for the Lincoln Park Study Area.

A hydrologic clay barrier was installed in 1988 to help contain the contaminated ground-water plume emanating from the mill site. This barrier is located upgradient of the SCS dam on Cotter's Cañon City mill site. Ground water and surface water are collected in a sump at the barrier and are pumped back to the lined, main impoundment.

From 1993 through 1999, Cotter implemented what is known as the Sand Creek Soil Cleanup Action within the Lincoln Park Study Area. This action (also known as the Sand Creek Cleanup Project) involved the identification and removal of mill tailings that had moved into the creek bed as the result of surface-water runoff from Cotter's Cañon City mill site. The transport of these contaminated materials into the creek bed and subsequent deposition of sediment occurred prior to the construction of the Soil Conservation Service ("SCS") dam in 1971.

The Sand Creek Cleanup Project involved removal of 9,000 cubic yards of contaminated tailings, soil, and sediment from 1.25 miles of Sand Creek within the Lincoln Park Study Area (see Figure 2). The cleanup objective was to remediate the creek to allow for unrestricted use of the area. To achieve this objective, the cleanup standard was set at 4 picocuries per gram ("pCi/g") for radium-226 as well as for thorium-230. All tailings, soil, and sediment containing levels of radium-226 or thorium-230 above 4 pCi/g were removed. This cleanup project was performed as part of Section 27 - Ephemeral Streams of the Remedial Action Plan (Cotter, 2000b and Cotter, 2000d).

To date, Cotter has performed all necessary cleanup actions for the soils within the Lincoln Park Study Area. The Sand Creek Soil Cleanup Action satisfies the statutory requirements of CERCLA, has eliminated the risks to human health and the environment from contaminated surface soils, and is not inconsistent with the NCP. Therefore, the selected remedy for the surface soils within the Lincoln Park Study Area is No Further Action. The decision to issue a Record of Decision ("ROD") for surface soils only, within the Lincoln Park Study Area, was based on the following factors:

- public comments received during the comment period for the Proposed Plan;

- recent publication of the new EPA drinking water standard for uranium in ground water;

- ongoing evaluation of the effectiveness of the permeable reactive treatment wall ("PRTW"); and

- additional evaluation of the appropriateness of issuing a "No Further Action" decision under existing circumstances for the Lincoln Park Superfund Site.

For these same reasons, EPA has decided to address the ground-water portion of the Lincoln Park Study Area at a later date.

Because previous surface soil cleanup activities have eliminated or reduced risks to acceptable levels, EPA and CDPHE have chosen No Further Action as the selected remedy for the surface soils within the Lincoln Park Study Area. Implementation of the conditions and terms of Cotter's Cañon City mill Radioactive Materials License will continue to ensure the protection of human health and the environment.

STATUTORY DETERMINATIONS

The selected remedy attains the mandates of CERCLA §121, and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective.

Previous surface soil cleanup actions for the Lincoln Park Study Area have eliminated the need to conduct further actions. Because the selected remedy will not result in hazardous substances, pollutants, or contaminants remaining onsite above health-based levels that allow for unlimited use and unrestricted exposure, a five-year review will not be required for the soil cleanup actions.

AUTHORIZING SIGNATURES AND SUPPORT AGENCY ACCEPTANCE OF REMEDY

-signed- *January 2002*

Max H. Dodson
Assistant Regional Administrator
Office of Ecosystems Protection and Remediation
U.S. Environmental Protection Agency, Region VIII

Date

-signed- *January 2002*

Douglas Benevento, Director
Environmental Programs
Colorado Department of Public Health and Environment

Date

DECISION SUMMARY

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LIST OF ACRONYMS AND ABBREVIATIONS

Avg	Average
BTAG	Biological Technical Assistance Group
CDM Federal	CDM Federal Programs Corporation
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended
COCs	Chemicals of Concern
Cotter	Cotter Corporation
EPA	U.S. Environmental Protection Agency
ERA	Ecological Risk Assessment
Fed C.O.	Federal Court Order
FS	Feasibility Study
GeoTrans	GeoTrans, Inc.
HHRA	Human Health Risk Assessment
HQ	Hazard Quotient
HRAP	Health Risk Assessment Panel
MCL	Maximum Contaminant Level
mg/kg-d	milligrams per kilogram per day
mg/L	milligrams per liter
µg/L	micrograms per liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priority List
OU	Operable Unit
pCi	picoCurie
pCi/g	picoCuries per gram
PRP	Potentially Responsible Party
PRTW	Permeable Reactive Treatment Wall
RAG	Remedial Action Goal
RAP	Remedial Action Plan
RAO	Remedial Action Objective
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SCS	Soil Conservation Service
State	State of Colorado
Stoller/Schafer	The S.M. Stoller Corporation and Shafer & Associates, Inc.
TRV	Toxicity Reference Value
Weston	Roy F. Weston

1.0 SITE NAME, LOCATION, AND DESCRIPTION

Lincoln Park Study Area (Operable Unit 2), Surface Soils
Lincoln Park Superfund Site; Cañon City, Colorado
CERCLIS # COD042167858

The Lincoln Park Superfund Site is located in Fremont County, Colorado, approximately 1½ miles south of Cañon City, 96 miles south of Denver, and 36 miles northwest of Pueblo (see Figure 1). The Superfund site includes Cotter Corporation's ("Cotter's") Cañon City uranium mill facility and a portion of the surrounding property, and a portion of the unincorporated community of Lincoln Park.

During the time period between 1958 and 1979, liquids from the alkaline-leach uranium milling process at Cotter's Cañon City mill seeped from unlined ponds into the ground water. This contaminated ground water, in turn, migrated toward the Lincoln Park Study Area. Soil contamination is present on the Cotter property itself, also as a result of uranium milling activities. Contamination was also spread in the past, via wind blown material, to soils adjacent to the mill, along the Sand Creek drainage on the mill property (causing contamination of sediment within the drainage), and into the community of Lincoln Park. Cleanup of contamination within the boundaries of Cotter's Cañon City mill property will be addressed during final closure and reclamation of the mill property, and is not the subject of this Record of Decision ("ROD").

The Lincoln Park Superfund Site has been divided into two Operable Units ("OUs"): the Lincoln Park Study Area (OU2); and a defined portion of Cotter's Cañon City mill property (OU1). The location and outline of the Lincoln Park Study Area is shown in Figure 2. The location and outline of the portion of Cotter's Cañon City mill property defined as OU1 is shown in Figure 3. For the purposes of this ROD, the Lincoln Park Study Area has been further divided based on the principal environmental media; soils and ground water.

The Colorado Department of Public Health and Environment ("CDPHE") has been the lead agency for the site, with assistance from the U.S. Environmental Protection Agency ("EPA"). Cotter, the potentially responsible party ("PRP"), has financed the cleanup actions.

Figure 1 (Site Location Map, Lincoln Park Superfund Site, Cañon City, Colorado)

Figure 2 (Lincoln Park Study Area, Lincoln Park Superfund Site, Cañon City , Colorado)

Figure 3 (Cotter Property, Lincoln Park Superfund Site, Cañon City, Colorado)

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Cotter Corporation was incorporated in the State of New Mexico on February 27, 1956 and started producing uranium oxide, or yellowcake, at the Cañon City mill in August of 1958. In addition to producing yellowcake, the mill produced both vanadium and molybdenum as by-products at one point in time. The mill was originally licensed by the Atomic Energy Commission, but authority for licensing was transferred to the Colorado Department of Health (currently called the Colorado Department of Public Health and Environment) in 1968.

The original mill used an alkaline-leach process and remained in service from July 1958 to the end of 1979. Ten ponds were used to store tailings, raffinate, and other liquids from the alkaline leach process. This area is referred to as the old ponds area.

In 1971 the Soil Conservation Service ("SCS") completed construction of an earthen dam across Sand Creek on Cotter's property. The dam was built to control flooding and has also served to prevent downstream movement of surface water and sediment from the mill site. Beginning in 1979, impounded water collected at the SCS dam was pumped back to the main impoundment.

In 1978, in preparation for operation as an acid-leach mill, a new main tailings impoundment was built. This main impoundment was constructed with a 60 millimeter hypalon liner and an 18-inch compacted clay subliner. The main impoundment was constructed as two cells to segregate acid-leach tailings and liquids (primary impoundment cell) from alkaline-leach tailings (secondary impoundment cell) (see Figure 3). In 1979, the mill was converted to an acid-leach process and this process was employed from 1979 to 1998, at which time the mill was reconverted to an alkaline-leach process.

Between 1981 and 1983, approximately 2.5 million cubic yards of alkaline tailings from the old ponds area were moved into the secondary impoundment cell. In 1989, the alkaline tailings in the secondary impoundment cell were covered with liquid for dust control and to create evaporative capacity. Additional contaminated soils were removed from the old ponds area from ground-surface level to bedrock and placed in the primary impoundment cell.

On December 9, 1983, the State of Colorado ("the State") filed a complaint against Cotter for injury to, loss of, and destruction of natural resources relating to their Cañon City uranium mill. This complaint was filed pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §9601 et seq.

On September 21, 1984, EPA placed Cotter's Cañon City mill site and the adjacent Lincoln Park community on the National Priorities List ("NPL"). Once placed on the NPL, the designated area became a Superfund Site. The term Lincoln Park Study Area refers to that portion of the residential neighborhood of Lincoln Park that has been adversely affected by Cotter's Cañon City mill operations (see Figure 2).

On April 2, 1986, the State and EPA executed a Memorandum of Agreement that established their respective roles and responsibilities for the Lincoln Park Superfund Site. Under this agreement, the State would act as lead agency with regard to oversight of the cleanup of the Lincoln Park Superfund Site.

A remedial investigation ("RI") (GeoTrans, Inc. ["GeoTrans"], 1986a) and feasibility study ("FS") (GeoTrans, 1986b) were completed in February 1986. Cleanup plans, which were evaluated in a Summary Remedial Alternatives Review, were completed as the Remedial Action Plan ("RAP"). The RAP required Cotter to perform cleanup actions, increase monitoring, and to conduct additional studies. The RAP is incorporated into the Federal Consent Decree for Civil Action No. 83-C-2389.

The RAP was incorporated into Cotter's Cañon City mill Radioactive Materials License (No. 369-01) as Condition 11.2 of Amendment 24 (Federal Court Order ["Fed C.O."], 1988). The Consent Decree with the State requires Cotter to implement and pay for all actions described in the Remedial Action Plan.

The remedial action work required by the RAP began in 1988. One such action was construction of a hydrologic clay barrier and pumpback system. The hydrologic clay barrier was installed in 1988 to help contain the contaminated ground-water plume emanating from the mill site. This barrier is located upgradient of the SCS dam on Cotter's Cañon City mill site. Ground water and surface water are collected in a sump at the barrier and are pumped back to the lined, main impoundment.

In addition to a Phase I human health risk assessment, which was completed in 1991 (HRAP, 1991), supplemental Phase II and Phase III human health risk assessments ("HHRAs") were completed in November 1996 (Roy F. Weston ["Weston"], 1996) and January 1998 (Weston, 1998), respectively. An ecological risk assessment was completed in February 1999 (The S.M. Stoller Corporation and Schafer & Associates, Inc. ["Stoller/Schafer"], 1999).

In 1995, EPA, CDPHE, and Cotter developed remedial action goals ("RAGs") for the Lincoln Park Superfund Site. RAGs consist of chemical concentrations that are protective and serve as specific numerical goals for cleanup actions. The RAGs for the Lincoln Park Superfund Site were established to aid in the development of both a decommissioning plan and a management/reclamation plan for the mill facility and Lincoln Park. Both of these plans are to be implemented under Cotter's Cañon City mill Radioactive Materials License.

In 1999, EPA and CDPHE developed Remedial Action Objectives ("RAOs") for the Lincoln Park Study Area. RAOs are general descriptions of goals for protecting human health and

the environment at a Superfund site. The following RAO was established for the soils portion of the Lincoln Park Study Area: limit the movement of contaminants from Cotter's Cañon City mill site into the Lincoln Park Study Area.

In addition to establishing RAOs, EPA and CDPHE also developed RAGs for the Lincoln Park Study Area. The following RAG is a subset of the above-mentioned RAO, is based on federal and State of Colorado environmental laws, and is the same RAG as that developed in 1995 for the Lincoln Park Superfund Site:

> *The average of all calculations for total radium concentrations at 1000 years including growth from thorium-230 and thorium-232, inclusive of background, will not exceed 4.0 picoCuries/gram ("pCi/g") for soil and sediments in residential areas and 6.8 pCi/g in industrial or commercial zones.*[1] *Soils and sediments with concentrations above these levels will be removed. Where these levels are achieved, such areas would be considered clean and available for unrestricted use.*

Cotter's Cañon City mill is presently authorized to operate under a renewed license issued on September 30, 1995. License Amendment 34, which became effective June 30, 1998, enabled Cotter to convert the mill from an acid processing method to an alkaline-leach process. Cotter began operating an alkaline-leach process, for the second time in the mill's history, in 1999; Cotter plans to operate for a minimum of 20 years. The Cañon City mill facility includes an abandoned alkaline-leach mill (90 percent of which has been torn down and properly disposed of on site), an active alkaline-leach mill, a spent catalyst plant, a partially reclaimed tailings disposal area, and an active tailings disposal area.

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[1] Thorium (Th)-230 and radium (Ra)-226 are decay products of uranium-238. Ra-228 is a decay product of Th-232, and total radium is a combination of Ra-226 and Ra-228. This RAO establishes cleanup objectives that are based on the concentrations of total radium that have formed, through decay of uranium and thorium, over a 1000-year period. These standards also factor in the amount of radium present as a result of naturally-occurring (or background) conditions.

Over the past several years, Cotter has implemented five cleanup actions within the Lincoln Park Study Area in response to offsite contamination caused by the Cañon City mill operations. One of these actions, the Sand Creek Soil Cleanup Action, was performed within the Lincoln Park Study Area and was designed to address contaminated soils and sediment. This action (also known as the Sand Creek Cleanup Project) was implemented by Cotter from 1993 through 1999 and involved the identification and removal of mill tailings that had moved into the creek bed as the result of surface-water runoff from Cotter's Cañon City mill site. The transport of these contaminated materials into the creek bed and subsequent deposition of sediment occurred prior to the construction of the Soil Conservation Service ("SCS") dam in 1971.

The Sand Creek Cleanup Project involved removal of 9,000 cubic yards of contaminated tailings, soil, and sediment from 1.25 miles of Sand Creek within the Lincoln Park Study Area. The cleanup objective was to remediate the creek to allow for unrestricted use of the area. To achieve this objective, the cleanup standard was set at 4 picocuries per gram ("pCi/g") for radium-226 as well as for thorium-230. All tailings, soil, and sediment containing levels of radium-226 or thorium-230 above 4 pCi/g were removed. This cleanup project was performed as part of Section 27 - Ephemeral Streams of the Remedial Action Plan (Cotter, 2000b and Cotter, 2000d).

A Proposed Plan, describing EPA's and CDPHE's preferred remedy, was issued on June 26, 2000 (EPA, 2000). The previously discussed cleanup action serves as the basis for EPA's and CDPHE's decision that no further action need be taken with regard to surface soils within the Lincoln Park Study Area. By issuing a separate no-further action decision for the surface soils, EPA may then proceed with deleting the soils portion of the Lincoln Park Study Area from the National Priorities List ("NPL").

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Public participation requirements are specified in CERCLA Sections 113 and 117. These sections require that before adoption of any plan for remedial action to be undertaken by EPA, the State, or an individual (e.g., PRP), the EPA shall:

1. Publish a notice and brief analysis of the proposed plan, which describes the proposed remedy, and make such plan available to the public; and

2. Provide a reasonable opportunity for submission of written and oral comments and an opportunity for a public meeting at or near the site regarding the proposed plan and any proposed findings relating to cleanup standards. EPA shall keep a transcript of the meeting and make such transcript available to the public. The notice and analysis published under item #1 above shall include sufficient information to provide a reasonable explanation of the proposed plan.

Additionally, notice of the selected remedy set forth in the Record of Decision ("ROD") must be published and the ROD must be made available to the public. The ROD must be accompanied by a discussion of any significant changes to the preferred remedy presented in the proposed plan, along with the reasons for the changes. A response to each of the comments, criticisms, and new data submitted in written form or oral presentations during the public comment period must be included with the ROD.

With regard to community participation activities, CDPHE has: performed community interviews; issued *Lincoln Park Citizens' Update* newsletters and topic-specific fact sheets; provided the local information repository (the Cañon City Public Library) with site-related documents; and co-authored the January 1998 *Community Involvement Plan for the Lincoln Park Superfund Site and Cotter Uranium Mill* with EPA.

EPA, with assistance from CDPHE, has conducted the following community participation activities in connection with the Lincoln Park Study Area Proposed Plan ("Proposed Plan"): distribution of the Proposed Plan to the public; publication of notices of a 30-day public comment period in local newspapers; hosting a formal public meeting; the presentation of the selected remedy in this ROD; and preparation of responses to both oral and written public comments (Responsiveness Summary).

The Proposed Plan was released for public comment on June 26, 2000. The public comment period ran from July 1, 2000 through July 31, 2000. The public meeting for the Proposed Plan was held on July 17, 2000. The Proposed Plan, and relevant site-specific documents upon which the Proposed Plan was based, were made available to the public in the Administrative Record located at the EPA Superfund Records Center in Denver, at CDPHE's Laboratory Building (Laboratory and Radiation Services Division) in Denver, and at the Cañon City Public Library in Cañon City. Notices were published in the Cañon City Daily Record, Colorado Springs Gazette, and Pueblo Chieftain newspapers on June 26 and July 12, 2000. These notices: announced the availability of the Proposed Plan and relevant site-specific documents for public review; briefly described the Proposed Plan; and announced the dates for the public comment period and the public meeting.

On July 17, 2000, EPA and CDPHE hosted a public meeting to present the Proposed Plan to the community. The meeting was held at 7:00 p.m. at the Cañon Inn in Cañon City, Colorado. Representatives from EPA and CDPHE presented the Proposed Plan and also discussed previous cleanup actions at both Cotter's Cañon City mill and the Lincoln Park Study Area. A No Further Action remedy was presented as the preferred course of action. Representatives from Cotter presented the PRTW ground-water cleanup action and a portion of the meeting was dedicated to accepting formal oral comments from the public. EPA's and CDPHE's responses to oral and written comments received during the public comment period are included in the Responsiveness Summary, which is Appendix A of the Record of Decision.

4.0 SCOPE AND ROLE OF OPERABLE UNIT

The Lincoln Park Superfund Site encompasses a large area (Figure 1). In order to facilitate site characterization and the remedy decision-making process, EPA and CDPHE established two Operable Units ("OUs") for the cleanup of this Superfund site. These OUs are based on geographical areas within the Superfund site. The OUs are as follows: a defined portion of Cotter's Cañon City mill property (OU1); and the Lincoln Park Study Area (OU2).

The first OU, a portion of Cotter's Cañon City mill property, will be cleaned up under Cotter's Radioactive Materials License closure plan. To date, there have already been several onsite actions that have served to contain historic sources of contamination. These actions were taken to prevent further contamination from occurring both onsite and offsite. Future cleanup of Cotter's Cañon City mill site will further address source areas of contamination through containment of liquids in lined ponds, removal and disposal of onsite contaminated soils, hydraulic containment of groundwater onsite, and minimization of airborne contaminants. Past, current, and future cleanup actions at this OU are part of the RAP, which has been incorporated into Cotter's Cañon City mill Radioactive Materials License.

Cleanup of the soils portion of the second operable unit, which is the subject of this ROD, addressed soil and sediment contamination caused by past mill operations. The Sand Creek soils cleanup action has eliminated risks posed to the community by removing contaminated sediment/soils.

No Further Action has been chosen as the selected remedy for surface soils within the Lincoln Park Study Area. This decision is based on the fact that soil cleanup actions, taken within the Lincoln Park Study Area, have reduced contamination to safe levels.

5.0 SUMMARY OF SITE CHARACTERISTICS

Site characterization of the Lincoln Park Study Area is based on information gathered for the *Remedial Investigation, Cotter Uranium Mill Site* (GeoTrans, 1986a), the *Feasibility Study, Cotter Uranium Mill Site* (GeoTrans, 1986b), the Human Health Risk Assessments (HHRAs) (Health Risk Assessment Panel ["HRAP"], 1991; Weston, 1996; Weston, 1998), and the *Lincoln Park Superfund Site, Ecological Risk Assessment* (Stoller/Schafer, 1999).

5.1 SITE DESCRIPTION

Cañon City and vicinity lie along the Arkansas River where the river leaves the Rocky Mountains and enters the Great Plains physiographic province. The community of Lincoln Park, which is about 1.5 miles south of Cañon City, is a semi-rural area in unincorporated Fremont County. The Lincoln Park Study Area is approximately 1.5 square miles in size (see Figure 2).

The current mill and associated facilities at Cotter's Cañon City operations occupy an area of approximately 82 acres, as shown in Figure 3. Almost all of the old mill buildings have been dismantled and placed in the primary impoundment. Southeast of the existing mill are the new primary and secondary impoundments. The old ponds area extends east of the existing mill. The tailings and underlying contaminated soil from the old ponds area were excavated and placed in the new, lined main impoundment.

The mill is located in a topographic depression that is the surface expression of an underlying structure called the Chandler syncline. The uppermost bedrock unit beneath the site is the Poison Canyon formation, which forms the core of the syncline. The open areas north of the mill are covered with Quaternary alluvium consisting of gravel, cobbles, boulders, and sands. Soils in the vicinity of the mill are classified as shallow and well

drained. The top layer consists of a brown loam; the subsoil is a pale brown loam, grading into a yellowish brown sandy loam.

The primary hydrologic feature of the Lincoln Park Superfund Site is Sand Creek. The original channel and natural features of Sand Creek, which were previously present within Cotter's Cañon City mill site, have been almost completely altered by earlier and on-going tailings disposal activities and by reclamation and remediation efforts at the site. The natural drainage also consists of West Fork Sand Creek, which joins Sand Creek south of the SCS dam. West Sand Creek passes within 500 feet to the west of the mill structures, but topographic protection (from potential flooding) is available in the form of a ridge line running between the channel and the mill structures.

Subsurface evidence suggests that both West Fork and Sand Creek channels were formerly braided streams. Most of the multiple channel sections are buried beneath later deposits or were removed by activities at the site. Sand Creek exits through the northeastern corner of the bowl-shaped valley in which Cotter's Cañon City mill is located. From the valley, Sand Creek flows through the Lincoln Park Study Area on its way to the Arkansas River. In its natural state, Sand Creek is an ephemeral stream with perennial sections near its confluence with the Arkansas River.

In 1971 the Soil Conservation Service ("SCS") constructed an earthen dam across Sand Creek on Cotter's property. The purpose of the dam was flood control. This SCS dam also prevents downstream movement of surface water and sediment from the mill site. Upstream of the SCS dam, there are ground-water containment systems (a hydrologic clay barrier and pump-back system) that intercept shallow ground water in the drainage. A marshy wetland area has developed upstream from the SCS dam and ground-water containment system.

Other hydrologic features of the Lincoln Park Study Area include the DeWeese Dye Ditch, an irrigation ditch that flows through the southern portion of the site (see Figure 2), and two irrigation ponds. The DeWeese Dye Ditch and the irrigation ponds are used seasonally during the summer growing period. Seepage from the ditch and ponds are a source of ground-water recharge to the alluvium within the Sand Creek drainage. These sources of water serve to both dilute and flush the contaminated ground water under Lincoln Park.

5.2 SITE MEDIA

Primary sources of contaminants associated with the mill site include the old tailing impoundments and process waters. Secondary sources of contamination include soils, sediments, and surface water that have been affected by mill processes and emissions from the stack (for the yellowcake dryer), and represent potential sources for further downgradient transport of contaminants, or exposure pathways. Currently, emissions from the stack are properly controlled and monitored in accordance with the mill's license.

Humans and the environment may be exposed to chemicals by a variety of exposure pathways. Major exposure pathways (i.e., ground water, surface water, soil and sediment, and airborne dust) are discussed below.

5.2.1 Ground Water

From 1958 to 1979, Cotter disposed of tailings from an alkaline leach mill into two lined and seven unlined ponds (a tenth pond was used for storage of fresh water). Liquids from the unlined ponds leached into the ground water and eventually migrated into Lincoln Park. Contaminants in ground water from the mill have, in the past, been detected near the Arkansas River (approximately 2½ miles downstream along the Sand Creek drainage).

As part of a cleanup action performed between 1981 and 1983, Cotter removed and placed the material comprising the old tailing ponds within newly constructed lined impoundments. Mill operations have been altered so that tailings in the new impoundments are covered by water or fill in order to prevent wind-blown dispersion of particulate matter. In addition, a hydrologic clay barrier was installed in 1988 to help contain the contaminated ground-water plume. This barrier is located upgradient of the SCS dam on Cotter's Cañon City mill site. Ground water and surface water are collected in a sump at the barrier and pumped to the lined, main impoundment. Even though soils and ground water from the old tailings ponds area contain elevated concentrations of site-related contaminants, offsite releases have been largely eliminated.

In 1989, Cotter conducted a water well use survey in Lincoln Park (IMS Inc., 1989). Based on the survey, Cotter determined that there were five Lincoln Park residents who had private wells affected by uranium and molybdenum contaminated ground water and who were not already connected to the Cañon City municipal water supply. These residents were connected to the municipal water supply during the period 1989 through 1993. Subsequent to this initial survey and hook-up effort, two additional homes were connected to the municipal water supply.

Over the years, the following two actions have contributed to the improvement of ground-water quality under Lincoln Park: (1) the hydrologic clay barrier, which was built to restrict the flow of contaminated ground water from the Cotter mill site; and (2) remediation of the unlined impoundment areas at the Cotter mill site, which eliminated the source(s) of contamination.

One other action was recently implemented to further improve the ground-water quality under Lincoln Park. In 1999, EPA and CDPHE updated the 1986 Feasibility Study for the Lincoln Park Study Area. The updated document is entitled *Final Focused Feasibility Study for Lincoln Park Superfund Site, Canon City, Colorado, Lincoln Park Study Area*

(CDM Federal Programs Corporation ["CDM Federal"],1999) ("Focused Feasibility Study"). This Focused Feasibility Study took into account additional technical studies performed since 1988 and evaluated and screened remedial alternatives for ground water. One alternative that was evaluated was a permeable reactive treatment wall ("PRTW") to be installed near the downgradient base of the Soil Conservation Service ("SCS") dam. It was determined that this alternative best met the nine evaluation criteria in the National Contingency Plan ("NCP").

Consequently, conditions for the design, construction, and operation of the PRTW were incorporated into the Radioactive Materials License for Cotter's Cañon City mill. The purpose of the PRTW cleanup action, which is on-going and not located within the Lincoln Park Study Area, is to reduce and eventually eliminate ground-water contamination within the Lincoln Park Study Area.

The PRTW cleanup action was chosen as the most effective way to control the one to three gallons per minute of contaminated ground water that had been bypassing a previously installed underground hydrologic clay barrier. This clay barrier is located on the upgradient side of the SCS dam. Accordingly, during the time period April through June 2000, Cotter installed a PRTW system across the Sand Creek channel (Cotter, 2000c and Cotter, 2000e).

Specifically, the PRTW is located downgradient of the SCS dam on Cotter property (see Figure 3). The PRTW contains a layer of zero-valent iron filings that serves to chemically remove uranium and molybdenum from the ground water passing through the PRTW prior to the ground water moving into the Lincoln Park Study Area. The duration of operation of the PRTW will depend upon how long it takes to remove uranium and molybdenum from the ground water originating from the source(s) of contamination.

Under the Radioactive Materials License, Cotter is required to monitor and report on the effectiveness of the PRTW. Ground-water samples are collected both upgradient and downgradient, as well as within the reactive media (iron filings). Constituents to be analyzed for are uranium, molybdenum, iron, and manganese. In addition, major ions such as sulfate, bicarbonate, carbonate, chloride, nitrate, sodium, calcium, potassium, and magnesium are also included in the analysis. Field parameters include: depth to water; pH; specific conductance; temperature; dissolved oxygen; and oxidation-reduction potential. Monitoring locations (nine total) within the reactive gate are to be sampled monthly during the first year of operation and quarterly thereafter. Monitoring wells located in the shallow aquifer adjacent to the PRTW are sampled quarterly. An evaluation of the PRTW's operation and monitoring program is performed on an annual basis.

Although shallow subsurface flow from Cotter's Cañon City mill site is designed to be contained by the SCS dam and associated subsurface hydrologic barriers, a small amount of contaminated ground-water flow has been detected leaving the site. To address this problem, the PRTW was constructed during the spring of 2000 to remove uranium and molybdenum prior to the ground water flowing into the Lincoln Park Study Area.

Lastly, to help ensure contaminated ground water is not used by residents of Lincoln Park, Cotter will conduct an institutional action (semi-annual review of the State Engineer's records).

5.2.2 Surface Water

Sand Creek is an ephemeral stream that becomes perennial just upstream of its confluence with the Arkansas River. The presence of contaminants in the surface water have been previously traced to this confluence. Surface-water runoff from Cotter's Cañon City mill site, via Sand Creek, was a pathway for offsite transport of mill-derived contaminants. Surface-water runoff, however, has been controlled since the construction

of the SCS dam in 1971. As a result of previously performed cleanup actions (described in Section 2.0), contaminant concentrations in the creek are now below cleanup objectives.

5.2.3 Soil and Sediment

Prior to implementation of the cleanup actions, contaminants were detected in sediments in the Sand Creek drainage; especially in reaches of the creek that experience low flow. The transport of these materials into the creek bed and subsequent deposits of sediment occurred prior to construction of the SCS dam. A cleanup action for the Sand Creek soils was conducted from 1993 through 1999. This action identified and removed mill tailings present within the creek bed, as described in Section 2.0 of this ROD.

5.2.4 Airborne Dust

In the past, a number of sources of wind-dispersed particulates existed on Cotter's Cañon City mill site. These potential sources included the main and secondary impoundments, the old ponds area, the ore stockpile, the ore handling area, and emissions from the stack for the yellowcake dryer. Wind-dispersal sources have been brought under control by Cotter through the following actions: covering the primary impoundment beaches with soil material; compaction, isolation, and annual inspections of ore pads; revegetation of the old pond area; and redesign and modification of the scrubber system for the yellowcake dryer. Management of dust emissions, including emissions from the impoundments, is a condition of the Radioactive Materials License. Techniques for dust suppression include: submerging the tailings within the impoundments in water; and using water trucks to keep road dust, and dust from the stockpile and handling areas, to a minimum.

Time-trend analysis of air monitoring data indicate that locations immediately east and west of Cotter's Cañon City mill site were, at one time, impacted by airborne releases from

the site. However, releases from the site are currently either below established limits or absent (Weston, 1998).

Air monitoring is conducted as part of a site-wide monitoring program to identify radionuclides in particulates in all four compass directions, plus additional locations near Cotter's Cañon City mill and in Lincoln Park (see Figure 4). To date, no elevated readings of uranium, thorium, radium, lead, or polonium have been detected during the air monitoring program. Results from the emissions/air monitoring program are published in Cotter's annual reports, which are available for review in the Cañon City Public Library. The *Calendar Year 2000 Environmental and Occupational Performance Report and ALARA Review* (Cotter, 2001), or 2000 Annual Report for short, presents the most recent environmental air sample data for ten air monitoring locations (see Figure 4). The results show that, as with the results for calendar year 1999, there were no exceedances of dose limits during the year 2000.

Figure 4. Environmental Air Sampler Locations, Lincoln Park Superfund Site, Cañon City, Colorado

6.0 CURRENT AND POTENTIAL FUTURE LAND USE

The Lincoln Park Study Area is located within an area zoned for residential and commercial use. Land-use surrounding and within the Lincoln Park Superfund Site is predominately commercial and residential, and privately owned. Cotter's Cañon City mill is owned by the Cotter Corporation and is licensed and utilized for industrial purposes.

The extent of the property owned by Cotter, including the mill site, is shown in Figure 3. The additional Cotter-owned property that surrounds the mill site will serve as a buffer zone. The existence of this buffer zone will effectively prevent commercial or residential development from occurring too close to that portion of Cotter's Cañon City mill property that has been designated as Operable Unit 1.

7.0 SUMMARY OF SITE RISKS

The following subsections summarize the results of the human health and ecological risk assessment work performed for the Lincoln Park Superfund Site.

7.1 HUMAN HEALTH RISKS

Three separate human health risk assessments ("HHRAs" or "Risk Assessments") were performed for the Lincoln Park Superfund Site. The first human health risk assessment, the Phase I Risk Assessment, was completed in 1991 (HRAP, 1991). This first assessment was a planning-phase document. In 1996, a supplemental human health risk assessment, the Phase II Risk Assessment (Weston, 1996), was performed to re-investigate the risks to residents of Lincoln Park based on environmental conditions as they existed during the time period of 1987 to 1988. This time period was selected for the assessment of "baseline" risks, that is, risks that would have existed in the absence of any cleanup actions.

A second supplemental human health risk assessment, the Phase III Risk Assessment (Weston, 1998), was performed in 1998 to address risks to current and potential future residents in Lincoln Park and other areas in the vicinity of Cotter's Cañon City mill site. The Phase III Risk Assessment based its evaluation on environmental conditions that existed during the time period 1994 through 1996. By selecting this time period, the risk assessors were able to evaluate the effectiveness of cleanup actions taken since 1988. This second supplemental human health risk assessment is the subject of the remainder of this section of the ROD.

7.1.1 Exposure Assessment

People may be exposed to chemicals in a variety of ways. The risk that a chemical poses to a person depends on the level and duration of exposure to that chemical. The purpose of an exposure assessment is to determine reasonable exposure scenarios and pathways of concern. For the Lincoln Park Superfund Site, the Phase III Risk Assessment evaluated the pathways by which people might be exposed to mill-related chemicals in the environment and described how the level of each exposure was estimated. A diagram of potential pathways for the Lincoln Park Superfund Site is presented in Figure 5. This diagram, or conceptual model, was developed specifically for the circumstances found at the Lincoln Park Superfund Site.

The conceptual model for the Lincoln Park Superfund Site (Figure 5) graphically illustrates the source of contamination, how the contamination might move through the environment, and how people, vegetation, and animals might get exposed to the contamination. The model was used by the risk assessors to focus their sampling and risk assessment efforts on the media and pathways by which people in Lincoln Park site might get exposed to mill-related contaminants.

For the Lincoln Park Superfund Site, the source of contamination was identified as Cotter's Cañon City mill property. The release mechanisms were determined to be ground water, stack emissions from the mill, and the tailings piles. Ground water was also designated as a contaminated medium and an exposure pathway.

The exposure assessment for the Phase III Risk Assessment determined reasonable exposure scenarios and possible pathways by which people might be exposed to mill-related chemicals in the environment.

Figure 5 (Site Conceptual Model, Lincoln Park Superfund Site, Cañon City, Colorado)

The Phase III Risk Assessment focused on exposure pathways for current and future residents living in the vicinity of Cotter's Cañon City mill site, based on environmental conditions that existed during the 1994 to 1996 time period. The following pathways were identified as being of main concern for the soils and sediments within the Lincoln Park Study Area:

- Ingestion of soil or dust contaminated by material from the site; and
- External radiation from radionuclides in soil;

7.1.2 Toxicity Assessment

The purpose of a toxicity assessment is to identify the possible adverse health effects (e.g., cancer, internal organ damage) caused by a chemical and the dose level at which these adverse health effects might occur. If the dose, or amount of a given chemical, is present below the level that causes adverse health effects, then that dose is considered safe. If the dose is present at or above the level that may cause adverse health effects, then that dose is viewed as likely to cause adverse health effects.

Also included in the Phase III Risk Assessment was an assessment of the toxicity of chemicals in the environment within the vicinity of Cotter's Cañon City mill site. The toxicity assessment identified possible adverse health effects (e.g., cancer, internal organ damage) caused by certain chemicals and the concentrations at which these illnesses might occur. The toxicity information was grouped into two categories: non-cancerous (i.e., internal organ damage) health effects; and cancerous health effects.

7.1.3 Risk Characterization

Risk characterization is the process of combining information on exposure with information on toxicity in order to estimate the nature and likelihood of adverse health effects occurring in the exposed population (Weston, 1998). Two types of risk evaluated during the risk characterization were cancer and non-cancer. Risk calculations performed in the Phase III Risk Assessment used standard Superfund risk assessment guidance and measured concentration values in environmental media at the site.

The Phase III Risk Assessment evaluated chemicals detected in water, air, soil, or food, unless a chemical could be excluded by one of two tests: 1) the chemical was a beneficial mineral (e.g., iron, sodium, calcium, etc.) and environmental levels would not lead to intakes that exceeded recommended daily intakes; and 2) the chemical existed at a concentration that was far below a level of health concern. A detailed description of the methods used to perform these tests may be found in the Phase II HHRA (Weston, 1996). Chemicals selected for evaluation were called "chemicals of potential concern."

Chemicals of potential concern are chemicals which may be released to the environment from site-related materials or operations and which may pose a health risk to current or future human populations in the area (Weston, 1996). The principal group of chemicals of potential concern are the various metals that may be present in ore material and in mill waste at Cotter's Cañon City uranium mill site. In addition, because uranium is radioactive, there is a family of radioactive decay products that may exist in the ore and waste materials. Table 1 is a list of the chemicals of potential concern for each medium.

Focusing on the surface soils within the Lincoln Park Study Area, the Phase III Risk Assessment provided the following conclusions for current and future residents in Lincoln Park and other areas in the vicinity of Cotter’s Cañon City mill site.

TABLE 1. CHEMICALS OF POTENTIAL CONCERN PHASE III HUMAN HEALTH RISK ASSESSMENT LINCOLN PARK SUPERFUND SITE			
Ground Water	**Air**	**Soil**	**Food**
Non-Radioactive	***Non-Radioactive***	***Non-Radioactive***	***Non-Radioactive***
molybdenum	aluminum	arsenic	arsenic
nickel	arsenic	beryllium	barium
lead	barium	cadmium	cadmium
selenium	chromium	manganese	chromium
sulfate	cobalt	selenium *	cobalt
uranium	manganese		lead
	vanadium		manganese
			molybdenum
			nickel
			strontium
			vanadium
			uranium
			zinc
Radioactive	***Radioactive***	***Radioactive***	***Radioactive***
lead-210	lead-210	lead-210 *	lead-210
polonium-210	polonium-210	radium-226	radium-226
radium-226	radium-226	thorium-230	thorium-230
uranium-234	thorium-230	uranium-234	uranium-234
uranium-238	uranium-234	uranium-238	uranium-238
	uranium-238		
	radon-222		

Notes:

* Was not measured in samples used in the risk-based screen, but was measured in samples from Lincoln Park. Therefore, the chemical was retained for evaluation in the detailed risk assessment.

Source: Phase III HHRA (Weston, 1998)

The Phase III Risk Assessment evaluated the potential risks from incidental ingestion of, and dermal (skin) radiation exposure to, soil near the mill and in the Lincoln Park area. With regard to wind-blown contaminated soil, it was determined that contamination was not detectable in areas north of the mill site. It was therefore concluded that these areas, including Lincoln Park, had not been impacted by air-borne deposition of mill-contaminated soil.

The Phase III Risk Assessment also evaluated the potential for soil to become contaminated by irrigation with contaminated well water. Results of the analysis indicated that some chemicals, including uranium and molybdenum, were present at statistically higher values in areas where irrigation with contaminated well water had occurred. However, these higher values were comparatively small and did not constitute risks that exceeded the normal range of concern.

For areas near the mill and Lincoln Park, it was determined that there was no significant risk of non-cancer illnesses occurring in residents ingesting soil. This conclusion applied to current residents in Lincoln Park, as well as to future residents living on properties closer to the mill.

Two chemicals, arsenic and beryllium, were identified as potentially increasing the risk of cancer when ingested. Estimated cancer risk from ingestion of these two chemicals was found to be almost entirely due to arsenic, with a minor contribution from beryllium.

Concentration data for arsenic was plotted and it was observed that there was no discernible spatial pattern of distribution. This observation supported the conclusion that arsenic levels in the soil had not been measurably altered by airborne releases from the mill.

In addition, it was also observed that arsenic concentrations in areas near the mill and Lincoln Park were similar to arsenic concentrations found in mineralized areas in the western United States. Consequently, it was concluded that the estimated cancer risk from arsenic in soil was natural in origin.

The Phase III Risk Assessment found that cancer risks from exposure to soil would be due almost entirely to external radiation from radium-226. Comparison of site data with naturally-occurring levels present in Cañon City and elsewhere within the State of Colorado concluded that soil concentrations of radium-226 in areas north of the mill property, including Lincoln Park, were within normal background ranges. These findings were a reflection of the successful elimination of risks that was accomplished through implementation of the Sand Creek Soil Cleanup Action. To achieve the desired level of cleanup, the standard was set at 4 picocuries per gram ("pCi/g") for radium-226 as well as for thorium-230. All tailings, soil, and sediment containing levels of radium-226 or thorium-230 above 4 pCi/g were removed from the Sand Creek drainage. This cleanup action made it possible for there to be unrestricted use of this area. Overall, the risk assessment concluded that there were no health risks, due to mill-related contaminants, from soil in yards.

For the complete risk assessment analysis of the chemicals of potential concern, please refer to the Phase III Risk Assessment (Weston, 1998).

7.1.4 Uncertainties

There is always a degree of uncertainty associated with estimates of risk; these include uncertainties regarding estimates of exposure and toxicity. Table 2 summarizes the uncertainties associated with the Phase III Risk Assessment.

TABLE 2. SUMMARY OF UNCERTAINTIES
PHASE III HUMAN HEALTH RISK ASSESSMENT
LINCOLN PARK SUPERFUND SITE

Probable Direction of Error	Source of Uncertainty
Underestimation of Risk	Lack of toxicity values for all chemicals of potential concern by all exposure routes Lack of local produce samples from areas of highest ground-water contamination
Overestimation of Risk	Use of upper-bound concentration estimates (either the upper confidence level of the mean or the maximum) to calculate exposure Use of conservative estimates of human contact with contaminated environmental media Use of conservative toxicity values to calculate potential risks to humans. Inclusion of naturally-occurring concentrations along with mill-related increases in concentration in all calculations of risk to residents.
Unknown Direction	Variations in analytical measurements Detection limits too high to derive accurate concentrations Toxicological or pharmacokinetic interactions between chemicals

Source: Phase III HHRA (Weston, 1998)

7.2 ECOLOGICAL RISKS

A baseline Ecological Risk Assessment ("ERA") was completed for the Lincoln Park Superfund Site in 1999 (Stoller/Schafer, 1999) and was performed under the direction of a Biological Technical Assistance Group ("BTAG"). The BTAG consisted of representatives from CDPHE, EPA, and Cotter.

The ERA was conducted to assess the potential for adverse ecological effects from the release of: windblown mill tailings; surface-water runoff; and subsurface water. The potentially impacted areas that were studied were Lincoln Park, Cotter's Cañon City mill site, and agricultural and open space lands adjacent to Cotter's property.

Within the context of the site conceptual model, ecological receptors could be exposed to site contaminants through direct contact with contaminated man-made material or ingestion of forage (vegetation) or prey that may have contacted contaminants (Figure 6). For plants and soil invertebrates (insects), direct contact is the most important pathway of exposure.

The assessment of ecological risks included both a preliminary screening-level evaluation, which identified data gaps, followed by supplemental sampling and analysis, and a baseline ecological risk assessment. These assessments were conducted in accordance with the most recent EPA guidance for conducting ecological risk assessments (EPA, 1997a).

7.2.1 Screening Level Ecological Risk Assessment

A screening-level risk assessment was conducted to aid in the identification of chemicals of concern ("COCs") associated with the site. These COCs included: arsenic; cadmium; copper; lead; molybdenum; nickel; radium-226; selenium; uranium; and zinc.

Figure 6 (Ecological Site Conceptual Model, Lincoln Park Superfund Site, Cañon City, Colorado)

Potential exposure points that were identified included soils, sediments, and surface water in the wetlands that receive runoff from the site. It was determined that both aquatic and terrestrial habitats could potentially be affected by site-related contaminants. Receptor species used in the screening-level ERA were the deer mouse, short-tailed shrew, mule deer, domestic cow, red fox, American kestrel, and American robin.

Prior to the screening-level assessment, supplemental soil, ground water, surface water, air, and vegetation samples were collected. The assessment also used data collected from the remedial investigation (GeoTrans, 1986a), data collected prior to the Phase II HHRA (Weston, 1996), and surface soil data collected in 1996 as part of the Phase III HHRA (Weston, 1998).

7.2.2 Baseline Ecological Risk Assessment: Problem Formulation and Study Design

The following ecological risk management goals were selected for the site:

1. Protect the integrity of wildlife habitat and the vegetation community from adverse impacts as a result of exposure to chemicals of concern ("COCs"); and

2. Protect wildlife populations from adverse impacts due to exposure to COCs.

Toxicity reference values ("TRV") were calculated as part of the toxicity assessment to quantify potential adverse effects on the ecology associated with exposure to COCs at the Lincoln Park Superfund Site.

7.2.3 Ecological Risk Characterization

Following the screening-level ERA, which was based on available soil data, supplemental biological tissue data collected from potential receptors were incorporated into a Phase I ecological risk characterization. If any of the COC/receptor combinations in the Phase I analysis resulted in a Hazard Quotient ("HQ") greater than one, these combinations were evaluated further in Phase II. This second phase included a more detailed analysis to characterize the magnitudes and sources of risk, identify spatial distributions of risk, and provide an assessment of probability that threshold levels might be exceeded. The second phase also characterized any uncertainties that might be associated with the analysis.

Based on the Phase II analysis, potential risks were characterized for vegetation, small mammals (deer mouse), ruminants, mammalian predators (red fox), avian predators (American kestrel and great horned owl), and aquatic life.

Vegetation

Although soil concentrations were found to exceed plant benchmark values (i.e., ecological screening values) for some chemicals of concern, the risk of impact to the vegetation community was determined to be minimal.

Small Animals

Risks to small mammals (i.e., deer mouse), from exposure to arsenic, radium-226, cadmium, and selenium, were found to be minimal for individuals and negligible for small mammal populations. This means that there may be a potential risk to certain more sensitive individuals, but that overall, the risk is below established action levels for the small mammal populations. In other words, exposure risks are no different than the risks associated with uncontaminated locations.

Ruminants

For the purposes of this discussion, the term “ruminants” is referring to cattle, horses, sheep, mule deer, and elk. Selenium concentrations in the vegetation and soil were found to pose no risk to mule deer, elk, or other wild ungulates. In addition, it was determined that the levels of selenium did not pose a risk to cattle or horses that might be grazed in pastures.

Risks to mule deer from arsenic, cadmium, and zinc were found to be minimal and for molybdenum, negligible. This means that there may be a small potential risk, for certain more sensitive deer, posed by arsenic, cadmium, and zinc; while the risk from molybdenum is below the action level. The potential for toxic exposure is associated with the scenario in which individual animals would spend weeks feeding in small areas northwest of the mill.

Molybdenum concentrations and low copper:molybdenum concentration ratios found in vegetation adjacent to the mill property were determined to have the potential to cause molybdenosis in cattle and sheep. However, evaluation of soil and vegetation data showed that low copper:molybdenum ratios were, for the most part, due to naturally low copper concentrations in soils of the area.

Mammalian Predators

Risks to predators such as fox, coyote, and cougar were determined to be negligible.

Avian Predators

Risks from toxic exposure to copper, radium-226, cadmium, and selenium were found to be negligible for the American Kestrel and Great Horned Owl. For lead, individual kestrels

or owls could be at risk if they fed a majority of the time at the site, but risks to populations were determined to be negligible. These raptors and their feeding behaviors were deemed to be representative of typical avian predators.

Aquatic Life

Aquatic risks were characterized based on data collected in the Arkansas River and Willow Lakes areas, and in those portions of Sand Creek with surface-water flows. Results of a study of the Arkansas River indicated that adverse impacts from Cotter's Cañon City mill site were minimal (Cotter, 1992). Results of a study of the Willow Lakes area also indicated that risks to aquatic life were minimal (Cotter, 1993). For the portions of Sand Creek that have flowing surface water and that are downgradient of Cotter's Cañon City mill site, risks to aquatic life from waterborne chemicals of concern were determined to be minimal (Stoller/Schafer, 1998).

Risk Management Recommendations

Overall, ecological risks and adverse impacts within the Lincoln Park Study Area appear to be minimal. Therefore, large-scale soil remediation aimed at reducing ecological risk was not recommended for Lincoln Park.

8.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Lincoln Park Study Area was released for public comment on June 26, 2000. The Proposed Plan described cleanup actions involving the cleanup of contaminated soils at three separate offsite railroad unloading areas outside the boundaries of the Lincoln Park Study Area. Although not directly related to the soil problems within the Lincoln Park Study Area, cleanup activities for the railroad unloading area(s) were described in the Proposed Plan in order to portray a more complete picture of cleanup actions that have been implemented. Because contamination at the offsite railroad unloading areas did not contribute to the soil contamination within the Lincoln Park Study Area, discussion of the cleanup actions for these locations has not been included in this Record of Decision ("ROD").

The Proposed Plan identified "No Further Action" as the appropriate remedial action for the Lincoln Park Study Area. Although the Proposed Plan identified EPA's and CDPHE's preference for no further action for the entire Lincoln Park Study Area, the remedy decision discussed in this ROD pertains only to the surface-soils portion of the Lincoln Park Study Area. A final decision regarding the ground-water portion of the Lincoln Park Study Area will be made at a later date.

EPA and CDPHE reviewed all oral and written comments submitted during the public comment period. Based on public comments received during the public comment period, EPA and CDPHE have concluded that issuance of a No-Further Action ROD for the Lincoln Park surface soils is appropriate at this time. There are several reasons why EPA and CDPHE have chosen to postpone final decision-making for the ground-water portion of the Lincoln Park Study Area.

First, at the time the Proposed Plan was issued, the uranium cleanup objective established for the Remedial Action Plan was 0.035 mg/L. On December 7, 2000, EPA promulgated a drinking water standard for uranium (0.030 mg/L). Because this new standard is Relevant and Appropriate[2] to the site cleanup, the Remedial Action Plan will be modified to meet the requirements of the new regulation. Procedures for modifying a ground-water standard are described in the Remedial Action Plan. The first step in the procedure is to collect ground-water data from designated Lincoln Park compliance wells for a specified period of time. A final remedy decision for the ground water under Lincoln Park will not be made until such time as the cleanup objective for the Remedial Action Plan has been modified to meet the requirements of the new drinking water regulation.

Secondly, although monitoring data indicate that the ground-water quality under Lincoln Park is gradually improving, there are portions of the aquifer that remain above cleanup objectives for uranium and molybdenum. Several members of the public expressed concern about issuing a No-Further Action ROD for ground water under these circumstances. Consequently, a final remedy decision for the ground water will be postponed. In order to effectively monitor the ground-water quality under Lincoln Park, EPA and CDPHE have concluded that it would be appropriate to expand the existing ground-water monitoring program for the Lincoln Park Study Area. This decision is in direct response to public comments.

The existing ground-water monitoring program is a requirement under the Radioactive Materials License for Cotter's Cañon City mill. Results of the monitoring program are reviewed by EPA and CDPHE to ensure continued compliance with cleanup objectives. Results from sampling events have been, and will continue to be, documented in Cotter's annual reports, which are available at the Cañon City Public Library.

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[2] Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that address problems or situations sufficiently similar to those encountered at a CERCLA site that their use is well suited to the site.

Finally, although not the subject of the Proposed Plan or Record of Decision, numerous public comments were submitted on the topic of deletion/delisting. Many of the comments expressed an interest in delaying this process. In response to these concerns, the delisting/deletion process for the ground-water portion of the Lincoln Park Study Area will be postponed.

However, because EPA has determined that: (1) no further cleanup action is necessary for the surface soils within the Lincoln Park Study Area; and (2) there are no longer any unacceptable risks posed by the surface soils, EPA is able to proceed with deleting the surface soils portion of the Lincoln Park Study Area from the National Priorities List ("NPL").

Deletion/delisting of the ground-water portion of the Lincoln Park Study Area will be considered at a later date and not until: (a) sufficient data have been collected to demonstrate that the PRTW is operating effectively; and (b) ground water under Lincoln Park is in compliance with cleanup objectives throughout the aquifer underlying the Lincoln Park Study Area. Any decision regarding deletion/delisting of the ground-water portion of the Lincoln Park Study Area will be based on whether or not any further actions are necessary to achieve cleanup objectives.

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APPENDIX A

RESPONSIVENESS SUMMARY